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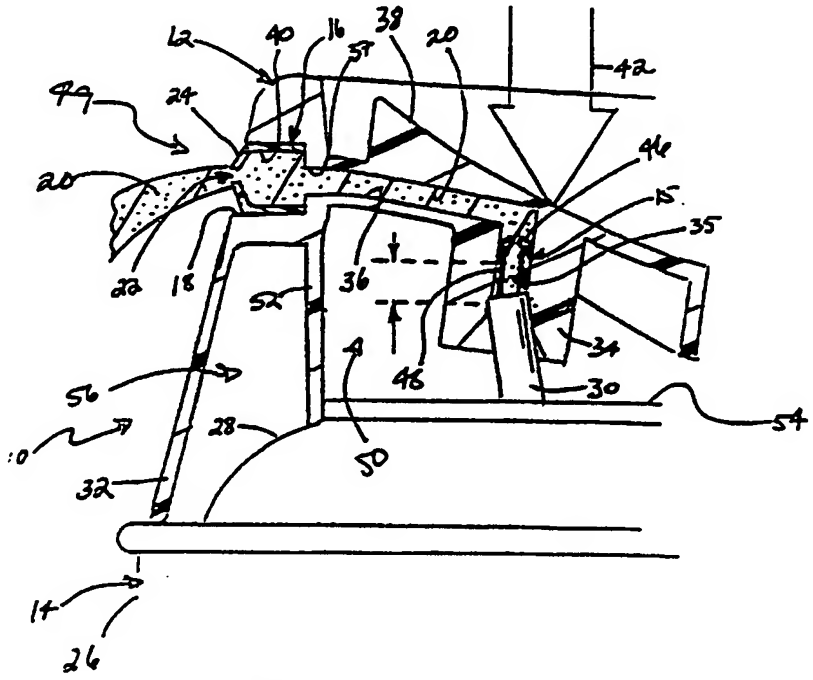


(57) Abstract: A pressurized container (10) includes a can (26) containing a pressurized substance (20) therein and having a discharge valve (30), a cap (12) providing a discharge passageway (36) having an inlet portion (35) coupled to the discharge valve (30) and an outlet portion (37), and a closure (15, 16) disposed in the discharge passageway (36). The closure (15, 16) is configured to move from a normally closed position to an open position when the discharge valve is actuated and the pressurized substance

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# DISPENSER OUTLET CLOSURE FOR PRESSURIZED CONTAINER

## Background and Summary of the Invention

The present invention relates to dispensers, and particularly to dispensers for pressurized containers. More particularly, the present invention relates to dispensers for pressurized foams and gels or foams and gels under pressure through a pump or airless dispenser.

According to the present invention, a pressurized container includes a can containing a pressurized substance and having a discharge valve, a cap providing a discharge passageway having an inlet portion coupled to the discharge valve and an outlet portion, and a closure disposed in the discharge passageway. The closure is configured to move from a normally closed position to an open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

In preferred embodiments, the closure is located adjacent to the outlet portion of the passageway. A closure could also be located adjacent to the inlet portion of the passageway.

The closure includes a face portion, and a side wall portion appended to the face portion and coupled to the passageway. The face portion is formed to include a product-discharge slit which moves from the normally closed position to the open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

The pressurized container includes a can containing a pressurized substance and having a discharge valve, a cap providing a discharge passageway having an inlet portion coupled to the discharge valve of the can and an outlet portion, and a diaphragm coupled to the discharge passageway to provide the closure. The diaphragm includes a product-discharge slit which moves from a normally closed position to an open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

Additional features of the invention will become apparent to those skilled in the art upon a consideration of the following detailed description of preferred

embodiments exemplifying the best mode of carrying out the invention as presently perceived.

Brief Description of the Drawings

The detailed description particularly refers to the accompanying figures in which:

Fig. 1 is a perspective view of a pressurized container including a can adapted to store a foam or gel or other material under pressure, a cap mounted on the top of the can and formed to include a dispenser outlet, a non-drip closure mounted at the dispenser outlet and formed to include a product-discharge slit arranged in a normally closed condition, and a non-leak plug mounted at an inlet portion of an L-shaped discharge passageway of the cap and formed to include a product-discharge slit arranged in a normally closed position;

Fig. 2 is a vertical section of the cap taken along line 2-2 of Fig. 1 showing the upright tubular discharge valve mounted on top of the can and the L-shaped discharge passageway formed in the cap and arranged to conduct pressurized foam, gel, or other material from the non-leak plug mounted in the cap at the inlet portion of the passageway to the non-drip closure also mounted in the cap at the dispenser outlet;

Fig. 3 is an enlarged sectional view similar to Fig. 2 showing downward movement of a touch pad included in the cap to move and actuate the tilt-actuated discharge valve to cause pressurized foam, gel, or other material to flow out of the can through the L-shaped discharge passageway formed in the cap from the non-leak plug to the non-drip closure and then to the surroundings through the product-discharge slit formed in the non-drip closure mounted in the cap;

Fig. 4 is a view similar to Fig. 3 showing closing of the product-discharge slits at both the dispenser outlet and the inlet portion of the passageway following release of the touch pad to cause pressurized foam, gel, or other material to be retained in the non-drip closure and L-shaped discharge passageway without dripping, drooling, leaking, or otherwise escaping from the cap after use of the touch pad to discharge pressurized product from the can;

Fig. 5 is a view similar to Fig. 4 showing the foam, gel, or other material remaining within the non-drip closure and L-shaped discharge passageway after use of the touch pad in a solid gel, foam, or powder-like state;

Fig. 6 is a view similar to Figs. 4 and 5 showing the solid foam, gel, or powder-like material "trapped" in the non-drip closure and L-shaped discharge passageway having changed from a solid state (as shown in Fig. 5) to a liquid state due to an increase in temperature and also showing this liquid state material being retained within the non-drip closure and L-shaped discharge passageway without dripping, drooling, leaking, or escaping from the dispenser outlet or the inlet portion of the discharge passageway;

Figs. 7-12 show front elevation views of alternative non-drip closure shapes and product-discharge slit patterns; and

Fig. 13 is a view of similar to Fig. 6 showing a preferred embodiment of a cap wherein a diaphragm is provided at the inlet of the discharge passageway and at the outlet of the discharge passageway to function as both a non-leak plug and a non-drip closure.

Detailed Description of the Drawings

A pressurized container 10 includes an actuator or cap 12 mounted on a can 14 adapted to store a pressurized foam, gel, or other material 20. Although container 10 is shown as a pressurized container, it is within the scope of this disclosure to include any type of container which has the ability to hold gel or foam within it under pressure, such as a pump or piston activated container, an airless dispenser, or a non-pressurized dispenser such as the ATMOS™ Dispensing System, for example. Container 10 further includes a non-leak plug 15 mounted in an L-shaped discharge passageway 36 formed in the cap and a non-drip closure 16 mounted in a dispenser outlet 18 formed in the cap 12. It is also within the scope of this disclosure, however, to include container 10 having either non-drip closure 16 or non-leak plug 15. In other words, non-leak plug 15 and non-drip closure 16 may be used in conjunction with each other or mutually exclusive of each other. It is also within the scope of this disclosure to include a discharge passageway that is generally vertical and not L-shaped such that pressurized product within can 14 would escape out a top

portion of cap 12 when discharged, such as many mousse-style actuators, for example. It is further within the scope of this disclosure to include a discharge passageway having a discharge passageway that is generally horizontal or any shape which generally leads from can 14 through cap 12 to the atmosphere.

Non-drip closure 16 is configured to retain pressurized product 20 in passageway 36 formed in cap 12 until a user desires to discharge pressurized product 20 from pressurized container 10 through a product-discharge slit 22 formed in an outer face 24 of the non-drip closure 16. In this way, "post-discharge" dripping or drooling of pressurized product 20 at dispenser outlet 18 of cap 12 is avoided. With an increase in temperature, pressurized product 20 may change from a solid state, as shown in Figs. 3, 4 and 5 to a liquid state, forming liquid product 21, as shown in Fig. 6. Non-leak plug 15 is configured to retain liquid product 21 from leaking or escaping from L-shaped passageway 36. Container 10 is preferably made of metal, however, it is within the scope of this disclosure to provide a container made of plastic, such as a plastic bottle, for example.

Can 14 includes a canister 26 and a dome-shaped closure member 28 coupled to canister 26. A discharge valve 30 is mounted on can 14 as shown, for example, in Figs. 2-6. It is within the scope of this disclosure to define discharge valve 30 as either a tilt-actuated valve (as shown), a vertical push-actuated valve, or a horizontally actuated valve. As mentioned above, the manner in which the foam or gel is discharged may further be through the use of a pump or piston activated valve, for example.

Cap 12 includes an outer shell 32 formed to include dispenser outlet 18 and a product conductor 34 coupled to outer shell 32 at dispenser outlet 18 and to discharge valve 30. Product conductor 34 is formed to include L-shaped discharge passageway 36 arranged to conduct pressurized product 20 discharged from discharge valve 30 to non-drip closure 16 mounted in cap 12 at dispenser outlet 18. L-shaped discharge passageway 36 includes an inlet portion 35 positioned to lie adjacent to discharge valve 30 and an outlet portion 37 positioned to lie adjacent to dispenser outlet 18. A touch pad 38 is appended to product conductor 34, as shown, for example, in Figs. 2-6 to enable a user to move product conductor 34 relative to outer shell 32 and can 14 to tilt and actuate discharge valve 30 as shown, for example, in

Fig. 3. Some slipping movement of product conductor 34 relative to discharge valve 30 during tilt-actuation of discharge valve 30 is permitted. Although it is preferred for container 10 to include cap 12, as described above, it is within the scope of this disclosure to include any type of cap or actuating dispenser coupled to can 14 which includes one or both of the non-leak plug 15 and non-drip closure 16.

Non-drip closure 16 includes an outer face 24 and a side wall 40 appended to a perimeter edge of outer face 24. It is within the scope of this disclosure to omit side wall 40 and couple outer face 24 to cap 12 in a fixed position. It is also within the scope of this disclosure to provide side wall 40 with any suitable shape or length and couple it to any portion of outer face 24 other than the perimeter edge of outer face 24. It is further within the scope of this disclosure to provide outer face 24 with any suitable shape and to form product-discharge slit 22 in any suitable regular, irregular, jagged, smooth, curved, straight, multi-section pattern including, for example, the patterns shown in Figs. 7-12. The inner diameter of the space defined inside the side wall 40 of non-drip closure 16 can be the same, smaller, or larger than the internal diameter of discharge passageway 36 near dispenser outlet 18.

Non-drip closure 16 can be made of any suitable soft rubber-like or plastic material that will allow slit 22 to open and close as described herein. Non-drip closure can be attached to cap 12 using any suitable means such as sonic welding, friction-fitting, gluing, sandwiching, etc. Non-drip closure 16 may also be formed by co-injection molding non-drip closure 16 and cap 12, each being made of a different injection molded material.

Non-leak plug 15 is also formed to include an outer face 46 and a side wall 48 appended to a perimeter edge of outer face 46. It is within the scope of this disclosure to omit side wall 48 and couple outer face 46 to inlet portion 35 of passageway 36 in a fixed position. It is also within the scope of this disclosure to provide side wall 48 of non-leak plug 15 with any suitable shape or length and couple it to any portion of outer face 46 other than the perimeter edge of outer face 46. It is further within the scope of this disclosure to provide outer face 46 with any suitable shape and to form a product-discharge slit (not shown) in any suitable regular, irregular, jagged, smooth, curved, straight, multi-section pattern including the patterns shown in Figs. 7-12. An inner diameter of the space defined inside side wall 48 of

non-leak plug 15 can be the same, smaller, or larger than the internal diameter of discharge passageway 36 at inlet portion 37.

Similar to non-drip closure 16, non-leak plug 15 can also be made of any suitable soft rubber-like or plastic material that will allow the product-discharge slit (not shown) to open and close as described herein. Non-leak plug 15 can further be made of a non-resilient, porous material or a unidirectional check-valve that is normally closed when there is no pressure behind it, for example. Non-leak plug 15 can be attached to cap 12 using any suitable means such as sonic welding, friction-fitting, gluing, sandwiching, etc. Non-leak plug 15 may also be formed by co-injection molding non-leak plug 15 and cap 12 as described above with respect to non-drip closure 16.

As shown in Figs. 1 and 2, the product-discharge slit 22 formed in outer face 24 of non-drip closure 16 and the discharge slit (not shown ) formed in outer face 46 of non-leak plug 15 are both closed prior to any discharge of pressurized product 20 from can 14 through cap 12. In use, a person applies a force 42 to move touch pad 38 downwardly to tilt and actuate discharge valve 30 causing pressurized product 20 to flow from can 14 through non-leak plug 15 and discharge passageway 36 formed in product conductor 34 to reach non-drip closure 16. If, however, a different type of actuator or cap or discharge valve is used, it is within the scope of this disclosure for a user to apply pressure in any direction which will activate the discharge valve. The pressure applied to plug 15 and closure 16 by the moving pressurized product 20 temporarily causes product-discharge slit 22 of closure 16 and the discharge slit of plug 15 to open as a result, in part, of deflection of outer face 24 and 46, respectively, as shown, for example, in Fig. 3. While product-discharge slit 22 is opened, pressurized product 20 flows .therethrough to the surroundings outside cap 12 as shown in Fig. 3.

As soon as the user releases touch pad 38, touch pad 38 and product conductor 34 move upwardly in direction 44 relative to can 14 as shown, for example, in Fig. 4 to "deactivate" discharge valve 30 to halt further discharge of pressurized product 20 into discharge passageway 36 from can 14. As such, pressurized product 20 is no longer moving through discharge passageway 36 to cause outer faces 24 and 46 to deflect and/or product-discharge slits 22 to open. The result is closure of both

product-discharge slits 22 . The closure of slit 22 of non-drip closure 16 acts to prevent, block, or otherwise stop further discharge (i.e., dripping or drooling) of pressurized product 20 through the dispenser outlet 18 formed in cap 12 to an outside region 49. Non-drip closure 16 operates to inhibit post-discharge foaming, dripping, or drooling of pressurized foam, gel, or other material in can 14.

Once touch pad 38 has been deactivated by a user, some product 20 remains within passageway 36, as shown in Fig. 5. The product 20, shown in Fig. 5, is shown to normally remain in a solid gel, foam, or powder-like state. When this "trapped" product 20 is subject to an increase in temperature, product 20 may change from the solid state to a liquid state forming liquid product 21, as shown in Fig. 6. Increases in product temperature may occur when container 10 is placed in a travel carrier (not shown), for example. The closure of the product discharge slit of non-leak plug 15 acts to prevent or block liquid product 21 from escaping from L-shaped discharge passageway 36 into a first cap region 50 defined by the outside surface of discharge valve 30, an inner wall 52 of cap 12, and a top surface 54 of can 14. By keeping liquid product 21 from leaking into first region 50, liquid product 21 is thereby prevented from leaking into a second cap region 56 defined by outer shell 32 of cap 12, inner shell 52, and dome-shaped closure member 28 and along the outside of can 14. Discharge valve 30 may also be made to remain attached at inlet portion 35 to reduce or eliminate product flow from this area. In the present invention, container 10 is a one-piece actuator having a non-removable cap 12. Container 10 prevents both the continued discharge of product 20 through dispenser outlet 18 to outside region 49 and the leakage of liquid product 21 into the first and second cap regions 50, 56, and finally along the outside of can 14.

A preferred pressurized container 110 is provided in Fig. 13. The features of container 110 are similar to those of container 10, shown in Figs. 1-6. However, container 110 includes a diaphragm 116 positioned at dispenser outlet 18 and at inlet portion 35 of passageway 36. Diaphragm 116, when positioned at dispenser outlet 18, acts as the non-drip closure 16 of container 10 and when positioned at inlet portion 35, diaphragm 116 acts as the non-leak plug 15. In other words, preferred container 110 includes the same part, diaphragm 116, for non-drip closure 16 and non-leak plug 15. As shown in Fig. 13, diaphragm 116 positioned at

inlet portion 35 is inverted with respect to the orientation of non-leak plug 15 of container 10. It is within the scope of this disclosure for diaphragm 116 to be inverted or right-side up within passageway 36.

Diaphragm 116 includes an outer face 124 and a side wall 140 appended to a perimeter edge of outer face 124. It is within the scope of this disclosure to omit side wall 140 and couple outer face 124 to cap 12 at dispenser outlet 18 and inlet portion 35 of passageway 36 in a fixed position. It is also within the scope of this disclosure to provide side wall 140 with any suitable shape or length and couple it to any portion of outer face 124 other than the perimeter edge of outer face 124. It is further within the scope of this disclosure to provide outer face 124 with any suitable shape and to form a product-discharge slit 122 in any suitable regular, irregular, jagged, smooth, curved, straight, multi-section pattern including, for example, the patterns shown in Figs. 7-11. The inner diameter of the space defined inside the side wall 140 diaphragm 116 can be the same, smaller, or larger than the internal diameter of discharge passageway 36 near dispenser outlet 18 and inlet portion 25.

Diaphragm 116 can be made of any suitable soft rubber-like material that will allow the product-discharge slit to open and close as described herein. Diaphragm 116 can be attached to cap 12 using any suitable means such as sonic welding, friction-fitting, gluing, sandwiching, co-injection molding, etc.

It is within the scope of this disclosure to mount a non-drip closure similar to closure 16 on an actuator (not shown) that is coupled to a discharge valve but is not integrally coupled to a cap. In such a case, the actuator is mounted on the container discharge valve and the non-drip closure is mounted on the actuator at a dispenser outlet formed therein. Once the cap is removed from the canister, the actuator can be operated to discharge pressurized product through a product-discharge slit formed in the non-drip closure.

Although the present invention has been described with reference to particular embodiments, one skilled in the art can easily ascertain the essential characteristics of the present invention, and various changes and modifications can be made without departing from the spirit and scope of the invention as set forth in the following claims.

CLAIMS

1. A pressurized container comprising

a can containing a pressurized substance therein and including a discharge valve,

a cap providing a discharge passageway having an inlet portion coupled to the discharge valve and an outlet portion, and

a closure disposed in the discharge passageway, the closure moving from a normally closed position to an open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

2. The pressurized container of claim 1, wherein the closure is located adjacent to the outlet portion of the passageway.

3. The pressurized container of claim 2, wherein the closure includes a face portion and a side wall portion appended to the face portion, wherein the side wall portion is coupled to the passageway adjacent to the outlet portion, and wherein the face portion is formed to include a product-discharge slit which moves from the normally closed position to the open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

4. The pressurized container of claim 2, comprising a plug disposed in the discharge passageway adjacent to the inlet portion, the plug moving from a normally closed position to an open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

5. The pressurized container of claim 4, wherein the plug includes a face portion and a side wall portion appended to the face portion, wherein the side wall portion is coupled to the passageway adjacent to the inlet portion, and wherein the face portion is formed to include a product-discharge slit which moves from the normally closed position to the open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

6. The pressurized container of claim 1, wherein the cap includes an outer shell formed to include a dispenser outlet and a product conductor formed to include the discharge passageway, and wherein the outlet portion of the discharge

passageway is coupled to the dispenser outlet and the inlet portion of the discharge passageway is coupled to the discharge valve.

7. The pressurized container of claim 1, wherein the closure is made of a flexible material.

8. The pressurized container of claim 7, wherein the closure is made of a soft rubberlike or plastic material.

9. A pressurized container comprising

a can containing a pressurized substance therein and including a discharge valve,

a cap providing a discharge passageway having an inlet portion coupled to the discharge valve and an outlet portion, and

a plug disposed in the discharge passageway, the plug moving from a normally closed position to an open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

10. The pressurized container of claim 9, wherein the plug is located adjacent to the inlet portion of the passageway.

11. The pressurized container of claim 10, wherein the plug includes a face portion and a side wall portion appended to the face portion, wherein the side wall portion is coupled to the passageway adjacent to the inlet portion, and wherein the face portion is formed to include a product-discharge slit which moves from the normally closed position to the open position when the discharge valve is actuated and the pressurized substance contained within the can (26) is released.

12. The pressurized container of claim 10, comprising a closure disposed in the discharge passageway adjacent to the outlet portion, the closure moving from a normally closed position to an open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

13. The pressurized container of claim 12, wherein the closure includes a face portion and a side wall portion appended to the face portion, wherein the side wall portion is coupled to the passageway adjacent to the outlet portion, and wherein the face portion is formed to include a product-discharge slit which moves from the normally closed position to the open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

14. A pressurized container comprising

a can containing a pressurized substance therein and including a discharge valve,

a cap coupled to the can to enclose the discharge valve, the cap including a discharge passageway having an inlet portion coupled to the discharge valve of the can and an outlet portion, and

a diaphragm coupled to the discharge passageway, the diaphragm including a product-discharge slit which moves from a normally closed position to an open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

15. The pressurized container of claim 14, wherein the diaphragm is located adjacent to the inlet portion of the passageway.

16. The pressurized container of claim 15, wherein the diaphragm includes a face portion and a side wall portion appended to the face portion, wherein the product-discharge slit is formed in the face portion, and wherein the side wall portion is coupled to the passageway adjacent to the inlet portion.

17. The pressurized container of claim 14, wherein the diaphragm is located adjacent to the outlet portion of the passageway.

18. The pressurized container of claim 17, wherein the diaphragm includes a face portion and a side wall portion appended to the face portion, wherein the product-discharge slit is formed in the face portion, and wherein the side wall portion is coupled to the passageway adjacent to the outlet portion.

19. The pressurized container of claim 14, wherein the diaphragm is made of a flexible material.

20. The pressurized container of claim 19, wherein the diaphragm is made of a soft rubberlike or plastic material.

21. A pressurized container comprising

a can containing a pressurized substance therein and including a discharge valve,

a cap coupled to the can to enclose the discharge valve, the cap including a discharge passageway having an inlet portion coupled to the discharge valve of the can and an outlet portion,

a first diaphragm coupled to the discharge passageway adjacent to the inlet portion thereof, the first diaphragm being made of a flexible material and including a product-discharge slit which moves from a normally closed position to an open position when the discharge valve is actuated and the pressurized substance contained within the can is released, and

a second diaphragm coupled to the discharge passageway adjacent to the outlet portion thereof, the second diaphragm being made of a flexible material and including a product-discharge slit which moves from a normally closed position to an open position when the discharge valve is actuated and the pressurized substance contained within the can is released.

22. The pressurized container of claim 21, wherein the first diaphragm includes a face portion and a side wall portion appended to the face portion, wherein the product-discharge slit is formed in the face portion, and wherein the side wall portion is coupled to the passageway adjacent to the inlet portion.

23. The pressurized container of claim 22, wherein the second diaphragm includes a face portion and a side wall portion appended to the face portion, wherein the product-discharge slit is formed in the face portion and wherein the side wall portion is coupled to the passageway adjacent to the outlet portion.

24. The pressurized container of claim 21, wherein the discharge passageway includes a first generally vertical portion coupled to the discharge valve and a second generally horizontal portion coupled to the outlet portion, wherein the first diaphragm is positioned to lie generally horizontally within the generally vertical portion of the discharge passageway adjacent to the inlet portion, and wherein the second diaphragm is positioned to lie generally vertically within the generally horizontal portion of the discharge passageway adjacent to the outlet portion.

25. The pressurized container of claim 6, wherein the product conductor includes a touch pad to enable a user to move the product conductor relative to the outer shell and the can to actuate the discharge valve.

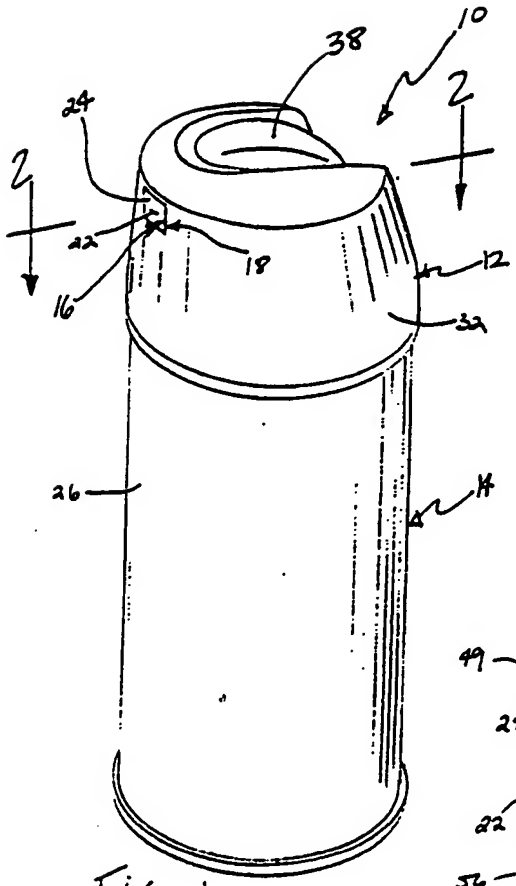



Fig. 1

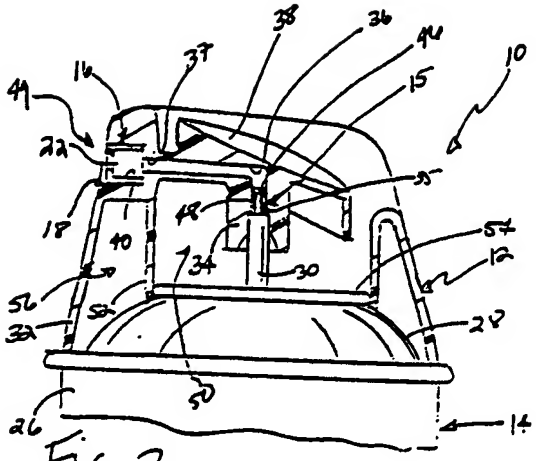



Fig. 2

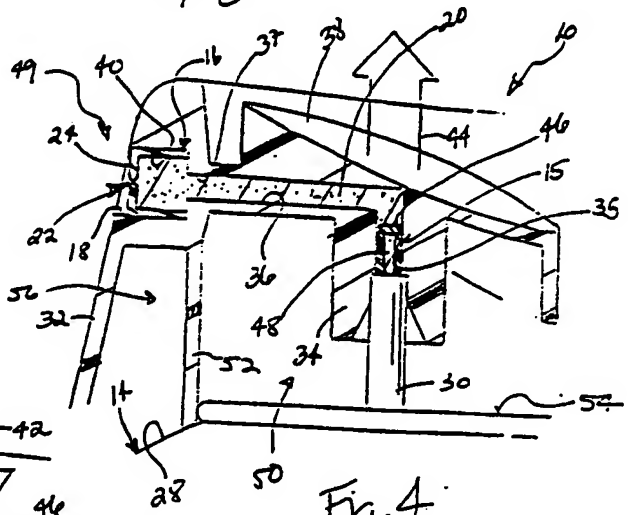
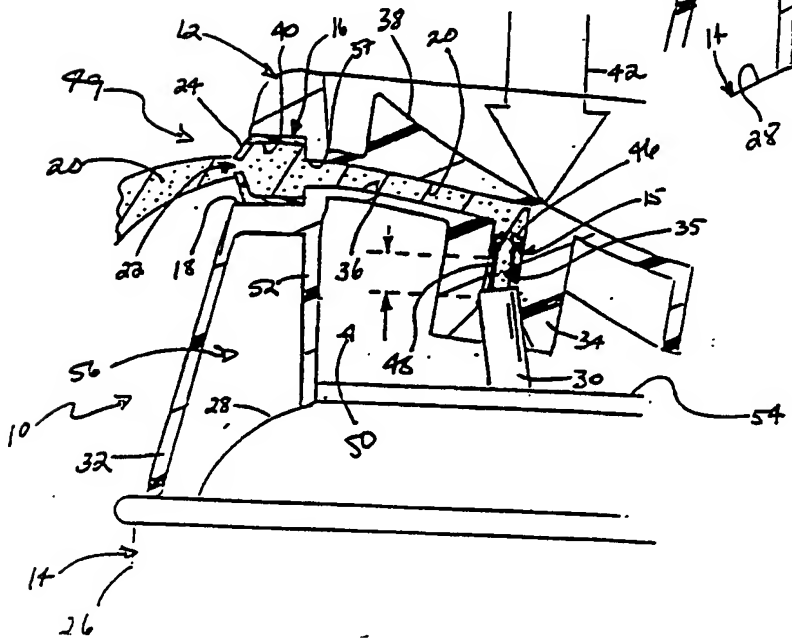



Fig. 4



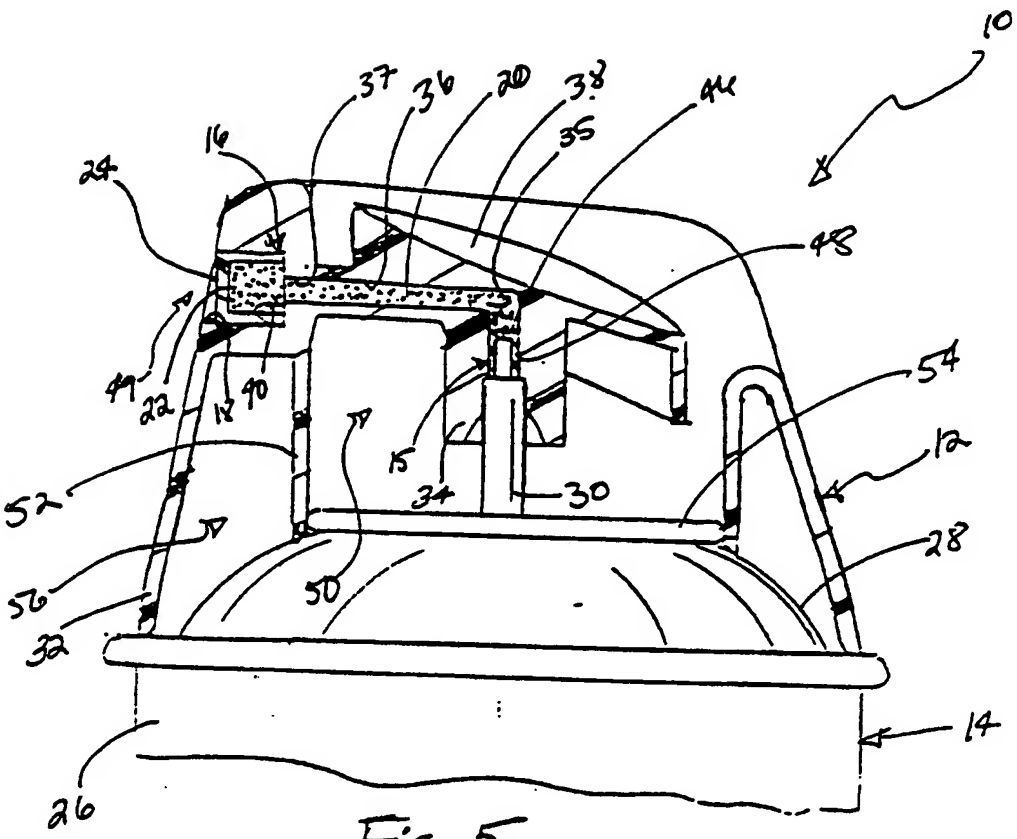

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Fig. 5

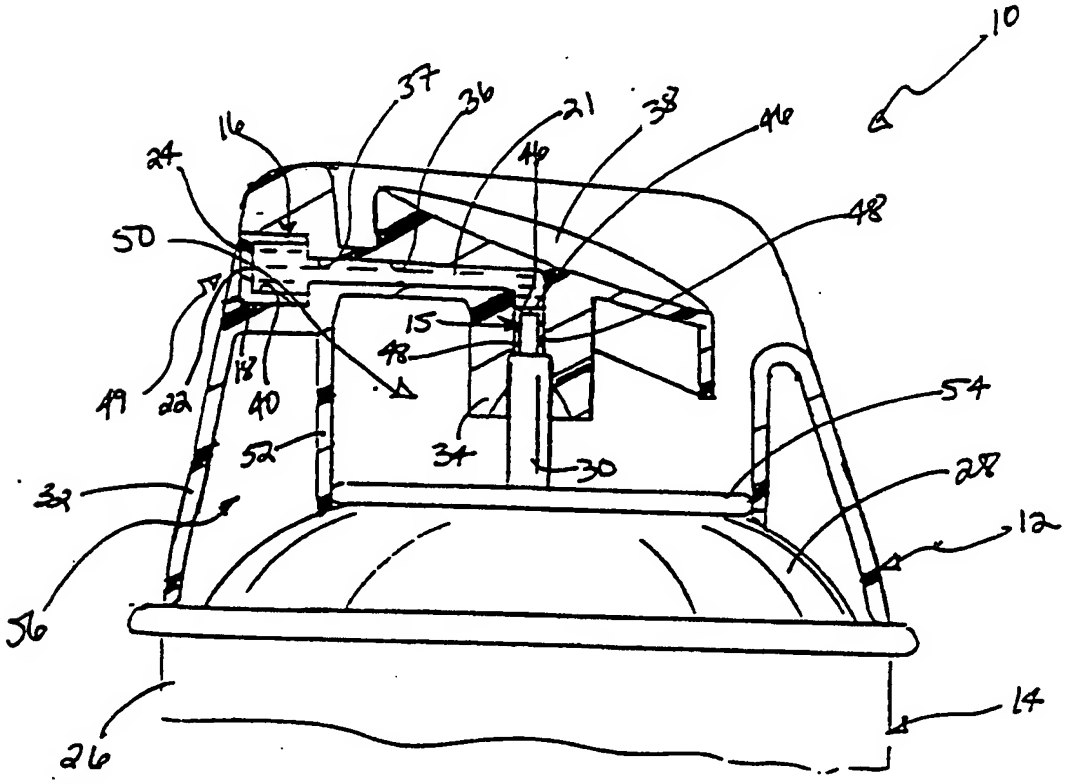
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Fig. 6

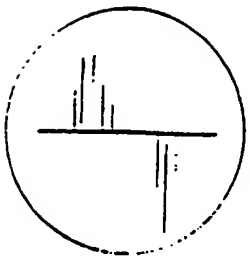

Fig. 7

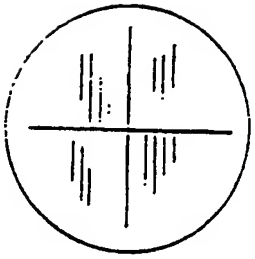

Fig. 8

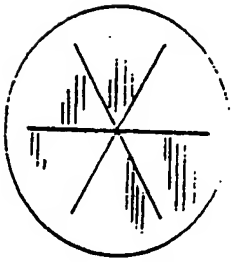

Fig 9

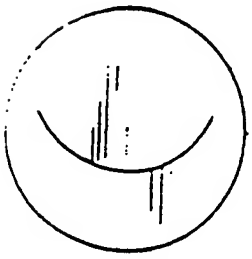

Fig. 10

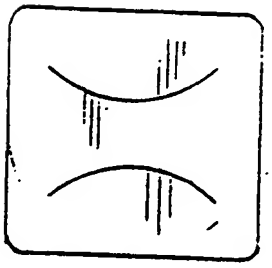

Fig. 11

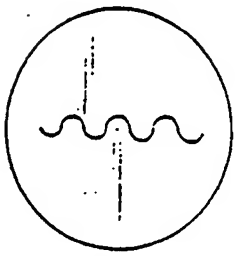

Fig. 12

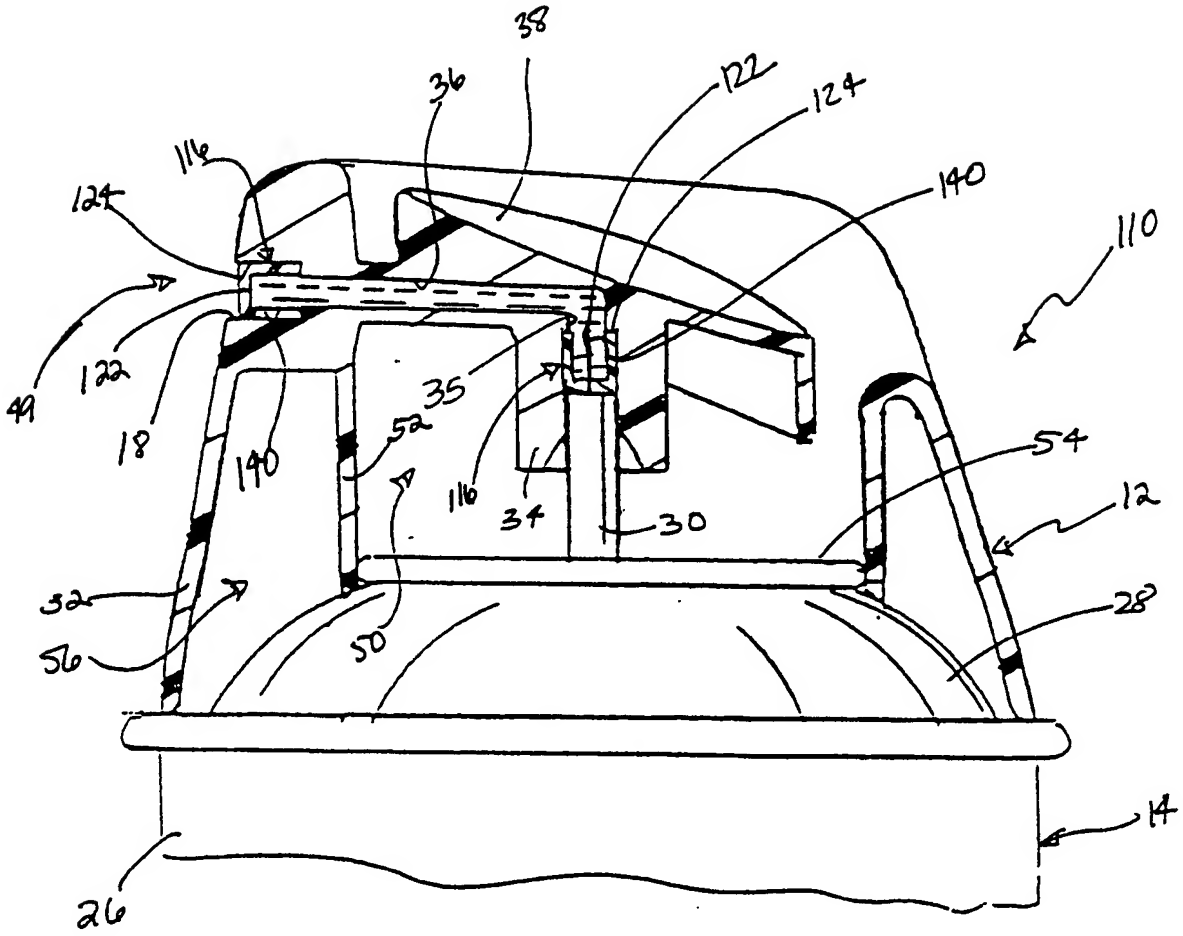
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Fig. 13

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/26691

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :B65D 83/00, 83/06, 83/14, 83/20, 25/40, 35/38, 5/72
US CL :222/402.13, 490, 494

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 222/402.13, 402.12, 494, 491, 490, 137, 571

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X<br>--<br>Y | US 5,732,855 A (VAN DER HEIJDEN) 31 March 1998, see entire document. | 1,2,6-9,14,17,19, 20,25<br>---<br>3-5,10-13,15,16, 18,21-24 |
| Y | US 1,783,419 A (FITCH) 02 December 1930, see entire document. | 3 |
| Y | US 5,476,197 A (LAWRENCE et al.) 19 December 1995, see entire document. | 4,5,10-13,15, 16,18,21-24 |

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

| | | | |
|---|---|---|---|
| * | Special categories of cited documents: | "T" | later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention |
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| "O" | document referring to an oral disclosure, use, exhibition or other means | | |
| "P" | document published prior to the international filing date but later than the priority date claimed | | |

| | |
|---|---|
| Date of the actual completion of the international search<br>17 NOVEMBER 2000 | Date of mailing of the international search report<br>27 DEC 2000 |
| Name and mailing address of the ISA/US<br>Commissioner of Patents and Trademarks<br>Box PCT | Authorized officer<br>Kevin Shaver |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/26691

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | US 5,273,191 A (MESHBERG) 28 December 1993, see entire document. | 21-24 |
| A | US 5,310,112 A (MESHBERG) 10 May 1994, see entire document. | 21-24 |